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(54) Title: PROGRAMMING OF BROADCAST RECEIVING DEVICES

(57) Abstract

   Teletext signals sent by a telephone transmitter (10) include teletext data and auxiliary video programming system data. For programming the receiver to record on a recorder (16) the VPS data comprises a page displaying programme items and a linked page which stores corresponding labelling information. When the user views a programme page decoded by the decoder (12) and stored in a memory (24) on a display (18) he can select a displayed item using a remote control keyboard (20). The corresponding labelling information is then extracted by a controller (14) from the linked page in the memory (24) and added to a stored list of selected items. Labelling information accompanying broadcast programmes is compared by the controller (14) with labelling information in the stored list. When a match occurs, the recorder (16) is switched on to record the programme.

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PROGRAMMING OF BROADCAST RECEIVING DEVICES

This invention relates to the automatic programming of
broadcast receiving devices, referred to herein as VPS (video
programming system).   Methods for labelling individual broadcast
television and radio programmes by means of auxiliary data carried
by, for example, teletext or RDS (Radio Data System) are already
established. Video recorders are being produced which can be pre-
programmed to receive and record the desired programmes even when
they are not broadcast at the scheduled time; these operate under
control of this auxiliary data which serves to identify the required
programme. Similar techniques can be used to pre-programme
television, radio and teletext receivers to deliver selected
programmes as they are broadcast, and to operate audio or data
recorders to store such programmes.

In one implementation, namely the German VPS, video recorders
are programmed using programme labels which are published alongside
the programme listings in newspapers and magazines. It has been
proposed that such data be entered by reading bar codes with a light
pen. It has also been proposed that a teletext page, broadcast as
part of the service, be used as part of the automated programming
process.   In one proposed system a teletext page containing the
listing of the programmes also contains concealed additional
information against some or all the entries, each set of information
being identified by a visible symbol against that item in the list.
A suitably-equipped receiver has a 'cursor' which, under user
control, can be made to identify a particular symbol. If that item
is selected by the user, logic within the receiver can gain access
to the appropriate concealed programme labelling data, which is in
fixed relationship to its corresponding symbol, e.g. the next five
(concealed) characters along the text row, and it then enters this
pre-programming instruction.

The system as described above is inconvenient for the teletext
editor as certain fixed parts of the page area must be reserved for
the labelling information which is required.

It is already known that undisplayed data may be sent in

teletext rows numbered above the twenty five displayable rows 0 to
24.   The row address is six bits, allowing further "ghost" rows 25
to 31 to be transmitted and it is known to use rows 26, 27 and 28 to
transmit data associated with the current page, whereas row 29 is
used for magazine-related data and rows 30 and 31 for unrelated
data.   The ghost rows do not provide sufficient capacity for the
amount of additional information which it is desirable to send,
particularly having regard to the existing demands on rows 26-28
for information such as cursor positions (explained below).

     It is now proposed that the necessary programme label
information be stored on a related teletext 'page' which can be
accessed by the receiver but which never need be displayed, indeed
it may be made undisplayable. Techniques for identifying a related
page are known (see, for example, our U.K. Patent 2 062 424). When
the viewer indicates that the programming function is required, the
decoder circuitry, without necessarily altering the displayed page,
can select and store a particular linked page. A modern receiver
equipped with multiple page stores may already have this linked page
waiting in storage. The linked page will contain all the labels
relating to the entries on the displayed page, either packed
together in predetermined sequence, in the interests of minimising
data transmission time and storage capacity, or set out within the
linked page in positions corresponding to the entries on the
displayed page.

     When the user selects a particular entry, by reference to its
particular adjoining symbol or possibly by moving the cursor to any
point within the displayed entry, the receiver extracts the
corresponding labelling information from the linked page.   The
receiver logic can be arranged to indicate on the displayed page
which item has actually been selected using additional information
stored on the linked page in order to give confirmation of the
user's instruction.

     The invention thus provides a broadcast teletext receiver with
user operable means for selection of one of a plurality of displayed
items on a first teletext page and means responsive to such
selection to access labelling information corresponding to the
selected item from another teletext page identified as a linked page

in the first page.

The receiver may identify the labelling information as the nth such information in the linked page, where the selected displayed item is the identified as n^{th} of the displayed items in the first page. The way in which the items are numbered for this purpose is immaterial. It may be the order in which the items occur down the page for example or the order in which cursor positions for the items are listed, in a manner explained below.

Alternatively the receiver may identify the labelling information as that occurring in the same position in the linked page as the selected displayed item occupies in the first page.

The invention also provides a method of broadcasting labelling information wherein a first teletext page is transmitted with a plurality of messages appearing as separate items on the displayed CUE page and with information identifying a linked page and labelling information corresponding to each message is transmitted in the Supplemental info linked page.

In this method, the linked page may be rendered undisplayable.

The invention will be described in more detail, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a block diagram of an embodiment of the invention;

Fig. 2 shows a programme information page;

Fig. 3 shows the format of a pointer message; and

Fig. 4 shows the format of a pseudo page.

At a transmitter station, a transmitter 10 combines the broadcast television signal with the teletext data which is transmitted in well known manner on certain television lines in the field blanking interval and includes auxiliary VPS data, whose format will be explained below. The composite signal is transmitted on a broadcast medium and, at a receiver, a conventional teletext decoder 12 extracts the teletext data, which is fed to a controller 14, from the selected channel and passes the video signal for this channel to a video tape recorder 16. The off-air or played-back video signal is fed to the receiver display 18 acting in particular as a teletext page display. The handling of the picture signal forms no part of the present invention, is conventional and will not be further described.

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Channel selection and also programming selections are made on a keyboard 20 which is typically a remote control unit communicating on one of several well known ways with the controller 14. A barcode reader 22 can be provided as an optional means of entering programming information.

The controller 14 is associated with a multi-page memory 24 for storing the currently displayed teletext page and associated pages. A programme information page may have a format such as that shown in Fig. 2 where each displayed text row consists of a shortened programme label (SPL), a schedule time and a programme name. The SPLs may be four decimal digit numbers assigned each week by the broadcaster to give the user a means of identifying a programme. The controller requires more information than is contained in such single codes to be able to control the recorder correctly on the basis of the auxiliary VPS data.

The VPS data accompanying a broadcast programme is a unique programme label (UPL) of say 36 or 40 bits repeated at suitable intervals and with such error checking/correcting strategies as are required. There are various possible carriers for this VPS data, including teletext ghost rows 30 and 31, and a digital stereo sound channel such as the recently defined NICAM-728 system for television sound.

The precise format of the VPS data is not important to the present invention but the following components may be included:

NI   Network identifier

PN   Programme number

UDT   Unified date and time (current)

PD   Programme duration

ET   Elapsed time (of current programme)

SPL   Shortened programme label.

NI and PN together constitute the UPL. UDT will be explained in more detail below.

In order uniquely to specify when an event occurs, and to allow a controller to arrange a series of events, from whatever source, in order of occurrence a simple increasing seconds count is needed. This should be the same at any instant throughout the world and it should be free from the discontinuities and ambiguities associated

with changes of time zone and daylight-saving time.

Such a system for recording date and time information is
already the subject of international standardisation in the CCIR.
Time is expressed in hours, minutes and seconds using Coordinated
Universal Time (UTC), which is based on counting seconds
from an atomic clock and which is kept within 0.9s of Greenwich Mean
Time by the occasional insertion of a 61st second in the last minute
of the half-year. Date is expressed as the Modified Julian Date
(MJD) which is a five-digit decimal day count incremented at UTC
midnight. The origin of the count (day 0) was 1858 November 17 and
1987 July 24 was MJD 47 000.

Note that the combination of MJD and UTC is ideally suited to
calculating the time difference between events or to putting events
in order of occurrence. Moreover, it is independent of calendar
convention and so equally applicable in countries where the
Gregorian calendar is not used.

The combination of UTC and MJD is already used in the UK
teletext system and in the VHF/FM radiodata system (RDS) to carry
time and date in machine readable form. In applications where a
display of local time and date is required, or where information is
to be entered manually or automatically using local time, the
conversion to and from UDT can be made by adding or subtracting a
"local offset" in the range -11 to +14 hours. This local offset can
be stored in the decoder in non-volatile memory and amended by the
user to account for daylight-saving time changes. Alternatively the
decoder can be programmed to adopt and follow the local offset
broadcast by a particular network of the user's choice.

Unified date and time is used in two ways in a video
programming decoder. It is used in the system clock which governs
the whole process, and which can be corrected or restarted using
broadcast UDT transmissions (which are, of course, the same from any
source at any given instant). It is also used to indicate the
expected time of transmission of a particular programme.

The system of Fig.1 is thus shown with a clock 26 for keeping
track of MJD and UTC and a register 28 for storing the local offset.

To enable the controller 14 to be programmed to record
programmes identified by UPL, as distinct from pure time

programming, it must be possible to supply the controller with a
selection word which contains at least the UPL and preferably also
the UDT for the scheduled programme time, the PD and SPL and also
MCP (menu cursor position - explained below). This represents well
over 100 bits per programme item on a programme information page,
which may carry as many as 20 programme items. The amount of data
required cannot be accommodated in the teletext page itself, either
as concealed data in rows 0 to 24 or as data in the ghost rows 26-
28. These ghost rows are however used to carry firstly a pointer
message and secondly MCP. The format of the pointer message is
shown in Fig.3. It comprises a command word plus parameters M
(magazine number), NN (page number) and SSSS (sub-code) and, when
detected by the controller 14, causes the controller to load the
pseudo-page identified by MNNSSSS into the memory 24.

One possible format for the pseudo-page is shown in Fig.4,
consisting of selection words S......W separated by word separators
WS, which allow variable length selection words. All 31 non-header
lines of the page can be used. Another possibility would be fixed
length selection words, in which case word separators would not be
required. Fig.5 shows the format of one selection word, comprising
NI, PN, UDT, PD and SPL.

The hardware of the controller 14 will not be described since
it is based essentially on a dedicated or suitably programmed
general purpose microprocessor interfaced to the required input and
output ports. Fig.6 shows the main functions implemented by the
microprocessor, excluding handling of pure manual control of the
system. These functions are handled in a manner well known per se
in microprocessor systems, using interrupt and/or time scheduling
techniques to allocate processor time to all functions.

In block 30 ghost row data is processed. This may involve
functions quite separate from those required by the present
invention. So far as the present invention is concerned, such
processing consists in recognising any pointer message command and
then loading the identified pseudo page. The MCP date is used as
described below.

In block 32 any user selections made via the keyboard 20 are
processed. The selection technique itself is described below but

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the principle is very simple. If the programmes on the programme
information page (Fig.2) are numbered 1, 2, 3 etc., (whether in the
order in which they appear on the page or not), the user selection
of the nth programme causes the nth selection word (Fig.4) from the
associated pseudo-page to be added to the recording schedule.

The recording schedule is an ordered list of the user
selections maintained (block 34) by an algorithm which can be made
as simple or sophisticated as desired. For example, it may be
arranged to warn the user that a selection which has just been made
will overwrite a simultaneous existing selection on another channel,
that an overlap of selected programs will occur if schedules are
maintained or an overlap will occur if schedules get out of step by
such and such an amount.

Block 36 simply maintains the clock 26 and may also be assumed
to handle adjustments to the offset stored in the register 28.

Block 38 compares received UPL's with UPL's in the recording
schedule. In order that the system may know what programmes are
coming in, the system is set up so that all transmitters carry all
UPLs for all channels receivable in their locality. When a
received UPL matches a stored UPL in the reading schedule, the
appropriate decisions are taken and commands are issued (block 40) to
effect channel selection and to turn the recorder on and off.
Again, algorithms can be built into block 38 to resolve actual
conflicts. For example, a recording currently being recorded may
always be given precedence over another selected programme which
comes on before the first recording is finished. As each selected
program is recorded it is removed from the recording schedule.

The operations in blocks 32 and 34 will now be considered in
more detail. Three possibilities exist. In the first place the
keyboard can be used to enter information. It would be unrealistic
to expect the user to enter complete UPL's but the user could enter
SPL's (four digits) and the microprocessor can then search the
pseudo-page (Fig.4) to find the SW containing the SPL which has been
entered. The SW thus found is passed to block 34 for adding to the
recording schedule.

In the second place, a process of menu selection, known per se,
can be used, as in German VPS. The cursor (e.g. a highlight bar) is

stepped from item to item and the user merely presses an "enter" key
(or a "delete" key if correcting an erroneous entry) when the cursor
is on a desired item. The MCP data in the ghost lines of the
programme information page identify the X,Y coordinate pairs of all
cursor positions in turn to enable the cursor to be stepped
correctly (e.g. skipping the second line of a two-line entry). This
technique is known per se.

The cursor stepping can be automatic (e.g. one step per second)
or commanded by a user "step" key.

The third possibility is to use the barcode reader 22. This
could enter UPLs directly, without reliance on the invention or
could enter SPLs to be processed in the same way as those entered on
the keyboard.

CLAIMS:

1.   A broadcast teletext receiver comprising user operable means
for selection of one of a plurality of displayed items on a first
teletext page, characterised by means responsive to such selection
to access labelling information corresponding to the selected item
from another teletext page identified as a linked page in the first
page.

2.   A receiver according to claim 1, characterised in that the
receiver identifies the labelling information as the nth such
information in the linked page, where the selected displayed item is
identified as the nth of the displayed items in the first page.

3.   A receiver according to claim 1, characterised in that the
receiver identifies the labelling information as that occurring in
the same position in the linked page as the selected displayed item
occupies in the first page.

4.   A receiver according to claim 1, 2 or 3, characterised by
means responsive to selection of an item to access the corresponding
labelling information and to add this accessed information to a
stored list of user selections.

5.   A receiver according to claim 4, characterised by means for
comparing labelling information accompanying received programmes
with the labelling information in the stored list and, when a match
occurs, operative to provide a switching signal for enabling the
selected item to be recorded.

6.   A receiver according to claims 1 to 5, characterised in that
the user operable selection means comprise means for entering a
short code in a displayed item and in that the access means are
responsive to the entered code to access the labelling information
corresponding thereto.

7.   A receiver according to claims 1 to 5, characterised in that

the user operable selection means comprise means for stepping a
cursor from displayed item to displayed item and an entry key whose
operation selects the item currently identified by the cursor.

8.   A method of broadcasting labelling information wherein a first
teletext page is transmitted with a plurality of messages appearing
as separate items on the displayed page and with information
identifying a linked page and labelling information corresponding to
each message is transmitted in the linked page.

9.   A method according to claim 8, wherein the identifying
information is included in a non-displayable teletext line of the
first page.

10. A method according to claim 8 or 9, wherein each labelling
information includes a unique programme label.

11. A method according to claim 10, wherein each labelling
information further includes data identifying the scheduled date and
time of transmission of the programmme.

12. A method according to claim 10 or 11, wherein each labelling
information further includes data indicating the duration of the
programme.

13. A method according to claims 10, 11 or 12, wherein each
labelling information further includes a short code identifying
the programme within a short time span consisting of a plurality of
days only.

14. A method according to any of claims 8 to 13, wherein the linked
page includes teletext codes rendering the page undisplayable.
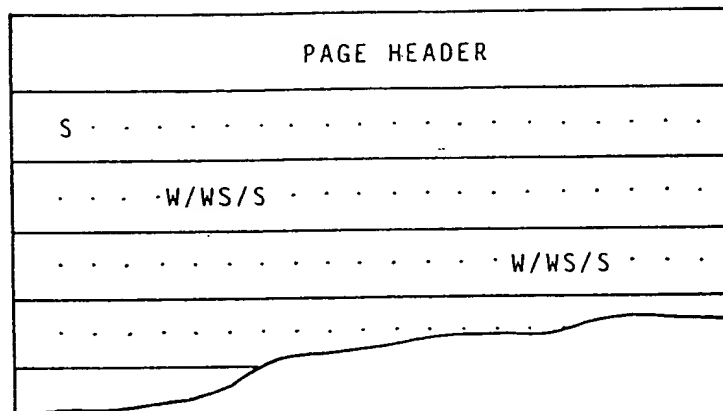
1/3

FIG.1

FIG.2

```
┌─────────────────────────────────────────────────┐
│          · TONIGHT's  PROGRAMMES                 │
│                                                  │
│   SPL    TIME     PROGRAMME       NAME           │
│   SPL    TIME     PROGRAMME       NAME           │
│    ¦      ¦           ¦             ¦             │
│    ¦      ¦           ¦             ¦             │
│    ¦      ¦           ¦             ¦             │
│    ¦      ¦           ¦             ¦             │
│    ¦      ¦           ¦             ¦             │
│    ¦      ¦           ¦             ¦             │
│    ¦      ¦           ¦             ¦             │
│    ¦      ¦           ¦             ¦             │
```
ROW 24
```
│   SPL    TIME     PROGRAMME       NAME           │
└─────────────────────────────────────────────────┘
```

ROW 25

ROW 26 ⎫

GHOST   ROW 27 ⎬ POINTER MESSAGE, MCP
ROWS
ROW 28 ⎭

ROW 29

ROW 30

ROW 31

FIG.3

COMMAND	M	N	N	S	S	S	S

FIG.5

NI	PN	UDT	PD	SPL

FIG.4

PAGE HEADER
S · · · · · · · · · · · · · · · · · ·
· · · W/WS/S · · · · · · · · · · · ·
· · · · · · · · · · · · W/WS/S · · ·
· · · · · · · · · · · ·

FIG.6

PROCESS GHOST ROW DATA
LOAD PSEUDO-PAGE IF COMMANDED — 30

PROCESS USER SELECTIONS — 32

MAINTAIN RECORDING SCHEDULE — 34

MAINTAIN CLOCK — 36

COMPARE RECEIVED UPL s
WITH UPL s IN RECORDING SCHEDULE — 38

CONTROL RECORDER
CHANNEL SELECTION — 40

INTERNATIONAL SEARCH REPORT

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC^4:   H 04 N 7/087

II. FIELDS SEARCHED

Minimum Documentation Searched 7	
Classification System	Classification Symbols
IPC^4	H 04 N

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included In the Fields Searched 8

III. DOCUMENTS CONSIDERED TO BE RELEVANT 9

Category *	Citation of Document, 11 with Indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13
Y	DE, A, 3335082 (TELEFUNKEN FERNSEH UND RUNDFUNK GmbH) 11 April 1985 see page 7, line 13 - page 10, line 16 --	1-12
Y	GB, A, 2146878 (PHILIPS ELECTRONIC AND ASSOCIATED INDUSTRIES LTD) 24 April 1985 see page 3, line 85 - page 4, line 24 --	1-12
Y	EP, A3, 0037077 (SIEMENS AG) 7 October 1981 see page 7, line 6 - page 13, line 6 --	1-12
Y	Rundfunktechnische Mitteilungen, volume 29, no. 4, July/August 1985, (Norderstedt, DE), A. Heller: "VPS - Ein neues System zur beitragsgesteuerten Programmaufzeichnung" pages 161-169 see the whole document -- ./.	1-12

* Special categories of cited documents: 10

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the International filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the International filing date but later than the priority date claimed

"T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
9th March 1988	1 8 APR 1988
International Searching Authority	Signature of Authorized Officer
EUROPEAN PATENT OFFICE	P C G. VAN DER PUTTEN

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	Funktechnik, volume 41, no. 6, June 1986, (Heidelberg, DE), C.L.M.: "Videorecorder-Programmieren mit VPV", pages 249-251 see page 249, right-hand column, lines 3-11; page 250, middle column, lines 13-16; page 251, left-hand column, line 19 - middle column, line 23	1
A	US, A, 4290062 (MARTI) 15 September 1981 see the whole abstract	1,14
A	EP, A1, 0128093 (TEXAS INSTRUMENTS INC.) 12 December 1984	

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.

GB 8700884
SA   19792

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on 08/04/88
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A- 3335082	11-04-85	DE-A,C 3337204	25-04-85
GB-A- 2146878	24-04-85	None	
EP-A- 0037077	07-10-81	DE-A,C 3012429	08-10-81
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82